Energy-water challenge emerges in Colorado River flows

March 22, 2016

‘Critical Watersheds Project’ to quantify climate-driven impacts, develop strategies for responding

LOS ALAMOS, N.M., March 22, 2016—As noted in today’s White House Water Summit, climate-driven heat-stress and forest mortality on the Colorado River watershed are expected to reduce river flows basin-wide out to the year 2100, based on the impact of multiple climate and climate-driven disturbance scenarios. Los Alamos National Laboratory, multiple Department of Energy national laboratories, Federal agencies, and large power utilities are examining these impacts on the energy-water nexus and will develop strategies for response.

“In our multidisciplinary research, we have identified an emerging climate change and energy-water nexus challenge, which is to understand the impact of climate-driven disturbances on short- and long-term water supply,” said Los Alamos researcher Richard Middleton.

As part of the three-year, $3 million “Critical Watersheds” project, Los Alamos is analyzing and quantifying the impact of disturbance on watersheds, ranging from fine-scale modeling of several-square-kilometer watersheds up to a regional-scale analysis of the entire Colorado River. Preliminary results suggest that climate-driven disturbances will have an increasing impact on regional water supplies. The Laboratory will release the data in May.

The Colorado basin—roughly 11 percent of the United States—directly supports water supply for more than 30 million people, accounts for approximately 15 percent of U.S. crops and livestock, and provides 53 gigawatts of power generation capacity. Around 90 percent of the basin’s cropland is irrigated: more than 3 million acres within the basin are irrigated and Colorado River water is used to irrigate a further 2.5 million acres outside the basin.

The Critical Watersheds project is currently coordinating with three other national laboratories (Sandia National Laboratories, National Renewable Energy Laboratory, and Pacific Northwest National Laboratory), the U.S. Bureau of Reclamation, and two large regional utilities (New Mexico and Arizona public service companies, PNM and APS respectively) on a prototype project that demonstrates connecting the natural system, including climate change and climate-driven disturbances, with managed energy and

water operations. At Los Alamos, the project is part of ongoing computational research into atmospheric phenomena and earth systems related to the nation's energy security.

"We anticipate that the project will identify key tipping points in the natural/engineered system in terms of managing water resources and energy extraction and generation," Middleton said. "In the long term, we aim to develop new approaches to managing water that account for the impact of climate change and climate-driven disturbances on water-supply demand and energy operations."